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A Method of Malignant Tumor Detection

SPOSOB DIAGNOSTIKI ZLOKACHESTVENNOY OPUKHOLI

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(57) Abstract

In essence, the invention is a universal method of diagnosing the presence of a malignant tumor by determining the erythrocyte sedimentation rate under the influence of two agents, namely an anti-idiotypic anti-empryonic serum and a control serum. The proposed method is characterized in that the first agent is rat serum, while the second agent is a serum from rats injected with lymphocytes from intact syngenic animals; the minimum and maximum erythrocyte sedimentation gradients are determined and used to determine the malignancy growth coefficient. A value for that coefficient of between 1.65 and 7.00 indicates the presence of a malignant tumor.

A METHOD OF MALIGNANT TUMOR DETECTION

FIELD OF INVENTION

The invention concerns the field of medicine, specifically the methods to detect malignant growth of tissues in living organisms.

BACKGROUND

As of now, serology and histology methods are in most common use for tumor detection; however, such methods are rather complicated for practice and they require expensive reagents and specially trained laboratory technologists. (EP 0305337, EP 0285029, EP 0313005).

The up-to-date serologic methods are specific, and they require a wide range of different diagnosticums. This fact results in high costs of examinations; further, they are time-consuming and unsuitable for mass preventive examinations in outpatient clinics.

The most similar to the claimed invention is a method of tumor detection, which includes application of the erythrocyte sedimentation reaction under the action of antiidiotypic antiembryonic serum (Patent RU 1836640; Class G01N 33/80, 1993).

This method is suitable for examination of tumor diseases within a wide spectrum; however, it fails to differentiate the malignant and benign growth of tumor cells.

Our method is suitable for identification of malignant tumors to differentiate them from nontumor diseases and healthy patients.

DISCLOSURE OF INVENTION

The purpose of the invention is to improve the detection of malignant tumors to a degree of accuracy required to

/3

differentiate them from benign tumors similar in their clinical presentations, and also from the pathologies of nontumor nature and from healthy individuals.

The desirable result was achieved after development of a universal express method to detect the malignant growth of tumors based on determination of erythrocyte sedimentation rate (ESR) with two agents, specifically an antiidiotypic antiembryonic rat serum (process agent) and the serum of rats pre-injected with lymphocytes of untreated syngeneic animals (reference standard agent) followed by calculation of the malignancy growth coefficients.

The method is realized as follows: To the patient's capillary or venous blood (100 µl) containing 10 % of 5 % solution of sodium nitrate [citrate - ? - Translator's Note) (in a physiologic saline, pH = 7.2) we add the respective process and reference agents (20 µl each, separately). As the reference standard is used the serum of rats, which were pre-injected with lymphocytes of untreated syngeneic animals in mycobacterial (Freund's complete) adjuvant (FCA).

The resulting mixture is agitated by shaking and then placed into the ESR capillary tubes for 1 hr at 37 °C. Once the ESR gradients have been determined for each sample, and their

minimum and maximum values found, the malignancy growth coefficient (K_{mg}) is calculated by the formula:

$$K_{mg} = \frac{/C_{max} - C_{min}/ x2C_{max}}{100}$$

Where K_{mg} = malignant growth coefficient;

C_{max} = maximum value of ESR gradient;

C_{min} = minimum value of ESR gradient;

/2

The range of K_{mg} values (K_{mg} = 1.55 - 7.00) points to the malignant growth of cells.

THE VERSIONS OF INVENTION REALIZATION

To illustrate, let us consider the case studies as follows:

Case Study 1. A female patient, XXX, age - 46. (Case History # 2948/95). Suspect for malignant tumor of mammal gland. ESR data were as follows:

With process agent - 20 mm

With reference agent - 16 mm

The calculated malignancy growth coefficient:

$$K_{mg} = \frac{(20-16)\times 40}{100} = 1.6$$

The calculated value of this coefficient point to malignant growth. The diagnosis was confirmed by serologic and histology examinations: Breast cancer, Stage I B.

Case Study 2. A male patient, XXY, age - 63. (Case History # 2846/95). Suspect for malignant tumor of stomach. ESR data were as follows:

With process agent - 25 mm

With reference agent - 13 mm

The calculated malignancy growth coefficient:

$$K_{mg} = \frac{(25-13)\times 50}{100} = 6.0$$

The calculated value of this coefficient point to malignant tumor of stomach.

The diagnosis was confirmed by additional examinations: Carcinoma of stomach, Stage III B.

/3

Case Study 3. A male blood donor, YYY, age - 32. Examinations by our malignancy method provided the ESR data were as follows:

With process agent - 9 mm

With reference agent - 14 mm

$$K_{mg} = \frac{(14 - 9) \times 28}{100} = 1.4$$

Diagnosis: A healthy individual has been confirmed also by parallel examinations.

Case Study 4. A female patient, ZZZ, age - 36. (Case History # 2964/95). Observed tumor growth in the mammal gland. Examinations for malignant growth provided the ESR data were as follows:

With process agent - 12 mm

With reference agent - 6 mm

$$K_{mg} = \frac{(12-6) \times 24}{100} = 1.44$$

Diagnosis: A benign tumor. Serologic and histology examinations have confirmed the diagnosis: Chronic cystic mastitis.

A total of more than 1,600 patients have been examined with our method in different clinics of Russia. Specifically, the examination data obtained in Moscow Medical Academy are shown in Table 1.

The Table illustrates very high sensitivity of the method (up to 100 %) that validates its great importance for tumor detection.

APPLICABILITY TO PRACTICE

Our method of malignant tumor detection is simple, universal; it is characteristic of high sensitivity and

/4

specificity and may be recommended for large-scale practice in medical institutions. The method is universal, i.e. it allows detecting tumors of different localization at any clinical stage of disease.

Table 1

Clinical diagnosis	Number of patients	Positive result	Negative result	Sensitivity	Histologicall confirmed desease
1. Tumor of kidney	15	12	3	86.6 %	Cancer - 12 Angiolipoma - 1 No cancer - 1 Pyelonephriti - 1

2. Tumor of urinary bladder	8	7	1	87.5 %	Cancer - 7 Transition cell papilloma; suspicions fo malignant transformatio
3. Prostate cancer	7	6	1	85.7 %	Cancer - 5 No cancer - 1 No [? - illegible] -
4. Hyperplasia (adenoma) of prostate gland	15	1	14	93.3 %	Rectal cancer in anamnesis - 1
5. Nephrolithiasis	10	0	10	100.0 %	No atypical cells
6. Post-surgery: 3 cases of gall bladder resection 2 cases of nephrectomy	6	0	5	100.0 %	No cancer confirming data (cystoscopy, ultrasonic scanning)

(tumors)					
7. Pyelonephritis (acute, chronic)	13	1	12	92.3 %	Andextumor (?
8. Chronic cystisis	9	0	9	100.0 %	Chronic cystitis pattern
9. Chronic prostatitis	8	0	8	100.0 %	
10. Kidney cyst; macrohematuria of unknown causation	5	0	5	100.0 %	No atypical cells in urin

/5

THE CLAIM

1. The method of malignant tumor detection based on determination of erythrocyte sedimentation rate (ESR) with two agents, specifically an antiidiotypic antiembryonic serum and reference serum distinctive in that the rat serum serves as the first agent in our method; as the second agent is used the serum of rats

pre-injected with lymphocytes of untreated syngeneic animals. The estimated minimum and maximum ESR gradients are used to calculate the malignancy growth coefficients. The coefficient values falling within the 1.55 to 7.00 range point to the presence of malignant tumors.

2. The method of malignant tumor detection as per p.1 distinctive in determination of minimum and maximum values of erythrocyte sedimentation rates.

3. The method of malignant tumor detection as per pp. 1, 2 distinctive in that the malignant growth is calculated by formula:

$$K_{mg} = \frac{(C_{max} - C_{min}) \times C_{max}}{100}$$

Where K_{mg} = malignant growth coefficient;

C_{max} = maximum value of ESR gradient;

C_{min} = minimum value of ESR gradient;

4. …. characteristics as per pp. 1, 2, 3 distinctive in that

…[No end]